Overview

Brazil has a large and diversified economy that offers US companies many opportunities to export their goods and services. As Brazil's largest single trading partner, the US enjoys a strong reputation in a variety of sectors. This report is one of a series that is published by the US Commercial Service's team of sector experts throughout the year. If you do not see an opportunity for your product here, please check out our other reports at www.buyusa.gov/brazil and consider contacting us directly to find out if we can help you export to Brazil.

Market Overview

The Renewable Energy sector in Brazil has a very large potential for development in the next years, with many new projects expected for 2005 to 2008. The main reasons for this are: (1) Brazil has excellent natural resources for wind, biomass, solar and small-hydro projects, and (2) the federal government created the Incentive Program for Alternative Electric Energy Sources (PROINFA), that guarantees the installation of 3,300 MW from small alternative sources until December 2008. This program is expected to attract US$2.5 billion in investments during the next three years. Small projects are defined in PROINFA as having a maximum installed capacity of 30 MW.

PROINFA subsidies for renewable energy
PROINFA guarantees the purchase of 1,100 MW generated annually from each of three power sources: wind, biomass and small hydro. Under this plan the Brazilian federal government, through its holding company Eletrobras, has already selected in 2004 the projects that are eligible to sell energy to the national grid in 20-year contracts (PPA) with autonomous independent producers. These selected projects will receive up to 70% cheaper financing from the Federal Economic and Social Development Bank BNDES; and must have a minimum 30% financed by equity capital. A special fund of US$280 million called "Brasil Energia" was already set up by private pension funds and BNDES to offer financing to project sponsors selected under PROINFA. In order to qualify for the PROINFA financing, a minimum of 60% of the project procurement must be of Brazilian-made equipment.

After this goal of 3,300 MW is installed, a second phase of PROINFA will immediately follow, to ensure that in the end of 20 years wind, biomass and small hydropower systems supply 10% of the annual electric power consumption in Brazil. For this second phase, only projects with at least 90% of Brazilian-made components will be eligible for BNDES financing.

Light for All
The Brazilian federal government has another important project, called "Light For All" (Luz Para Todos) which set a goal to achieve universal access to safe and affordable energy, as one of the central components in its fight against rural poverty.

There are currently nearly 18 million Brazilians living in remote communities that do not have reliable access to electricity, being that almost 10 million of them do not use electricity in any form. In the Amazon region, with an extremely low population density of 3.7 hab/km2, there are more than 1000 mini power plants, mainly using diesel oil to supply electricity to isolated villages at a very high cost. Many of them are old and inefficient.

Brazil's Current Energy Mix

Brazil needs to increase its generation capacity by an additional 3,000 MW annually. Approximately 77% of the total electricity in Brazil is generated by hydroelectric power plants, and Brazil accounts for nearly 12% of the world's hydroelectric power supply. Power shortage and rationing of electricity in 2001 led to a top government priority of diversifying the energy matrix. The rationing ended in March 2002, but it was a landmark in the progress of renewable energy in the country.

About 46% of Brazil's energy matrix comes from renewable sources, especially hydroelectricity, biomass and ethanol, while this percentage tends to be between 6% and 15% in developed countries. 98% of the Brazilian electrical market is one vast interconnected system.

Energy Mix in Brazil (Feb 2004)

Type	Capacity	%
Hydro	74,225 MW	77.3 %
Gas:	7,295 MW	7.6 %
Petroleum:	5,842 MW	6.1 %
Nuclear	2,007 MW	2.1 %
Coal	1,461 MW	1.5 %
Biomass*	2,556 MW	2.7 %
Wind	24 MW	0.03 %
Imported	2,570 MW	2.7%

* 57% of Biomass is sugarcane.

Brazil's Total Energy Matrix 2004	
Type	**%**
Petroleum	43%
Sugar Cane	15%
Hydro	14%
Firewood and Charcoal	14%
Natural Gas	9%
Metallurgical Coal	1%
Uranium	1.8%
Other Renewable Sources	3%
Steam Coal	0%

Includes all forms of energy used in Brazil, not just generation.

Sector References for Renewable Energy in Brazil

The national reference centers CERPCH (small hydro), CRESESB (wind), GREENSOLAR (solar and wind) and CENBIO (biomass) promote the development of R.E. by disseminating information, supporting studies and projects, laboratories and working groups and establish a network between industries, schools, universities, utilities and government agencies. See their web addresses in pertinent reports.

Eletrobras/Centrais Elétricas Brasileiras S.A. is the federally owned state electricity company and was until recently the former vertical monopoly, for construction, generation, transmission and distribution of electricity. power utility. www.eletrobras.gov.br

CRESESB, hosted by CEPEL Electrical Energy Research Center of Eletrobras, www.cresesb.cepel.br, manages two working groups on solar and wind, whose membership includes universities, government, agencies, private companies, research centers and engineering companies. Its website has a long list of Brazilian suppliers of products and services, divided by sub-sector, with links to their respective websites. It has worked in cooperation with the USDOE for many years, including joint-projects with the NREL. It also works very closely together with the major Brazilian utilities.

ABEER The Brazilian Trade Association for Renewable Energy and Energy Efficiency, www.abeer.org.br . It sponsors a trade show on R.E. in Brazil, to be held on Oct. 13 and 14, 2005 in Rio de Janeiro: www.saagle.com.br .

ANEEL National Agency for Electrical Energy, www.aneel.gov.br, independent regulatory agency, with powers to grant concessions and authorizations for building and operating power plants, and for supplying electricity to the national grid, and charged with promoting and regulating competition in this sector.

APMPE Association of the Small and Medium-Sized Electric Power Producers, www.apmpe.com.br, interested primarily in small hydropower projects.

BNDES National Bank for Economic and Social Development www.bndes.gov.br, the only source of financing at rates below commercial banks, is an important tool of the federal government to incentive the development of R.E. in Brazil.

IDER Institute of Sustainable Development and Renewable Energy www.ider.org.br

RENOVE National Network of Organizations for Renewable Energy www.renove.org.br, network of 26 organizations working primarily in rural areas to support the commercialization of R.E., as well as research and education. It provides technical assistance, small demonstration projects, and promotion of development models that rely on public/private partnerships. Its members are NGOs and research institutions.

USAID The U.S. Agency for International Development, www.usaid.gov, supports R.E. demonstration projects and cooperation between U.S. and Brazilian firms and public institutions.

ABIMAQ The Brazilian Association of Machinery Manufacturers, www.abimaq.org.br. It has a large databank of Brazilian suppliers of all kinds of machinery, that can be accessed online.

Winrock International, a non-profit international NGO whose mission is to support projects that increase economic opportunity, sustain natural resources and protect the environment. It works on several projects in Brazil, for natural resources management and clean energy www.winrock.org.br.

ABCE Brazilian Association of Engineering Consultants, www.abce.org.br .

Agência Mandalla www.agenciamandalla.org.br, NGO supporting sustainable development projects, including alternative energy sources.

Best Prospects - Overview

Export opportunities to Brazil in the Solar sector are for specific parts or services, but not for turn-key equipment. Since Brazil has a very diversified industry, and import duties and fees are high, Brazilian-made products are normally cheaper than similar imports. Examples of products and services that have best prospects to be imported are automation systems, remote operation control, internal combustion engines, gaseification equipment and logistical services to move wind power equipment.

Solar – Overview of Market Conditions

Brazil has one of the world's most abundant solar energy resources, but has only just begun to explore its potential.

Water Heating
The use of solar water heaters in Brazil has increased very much in the last years. There are nearly 140 manufacturers of these products in Brazil, for applications in residences, hotels, hospitals, and swimming pools. Most of them are very small companies. Traditionally, Brazilian residences use electric heaters. The electricity rationing in 2001 in Brazil caused an explosive increase in demand for solar heaters in 2001 and 2002. This trend has since slowed, but demand is still strong. According to the trade association ABRAVA, there are more than 500,000 residences in Brazil using solar water heating, which can still be considered a very modest number by international comparison, and the potential for growth is enormous.

Brazilian consumers are highly price-sensitive. The preference for low prices, despite sacrifices in quality, makes it difficult for more sophisticated products to enter the market. There is little demand for highly efficient equipment because of Brazil's abundant sunshine, and of the increase in cost for such technologies.

Photovoltaic Systems
PV technology is a competitive alternative to grid extension in Brazil, in remote areas of the country and for applications of social interest. Despite the privatization process that the electric power sector is undergoing, the government retains the task of stimulating or providing electricity to remote regions that are not considered attractive business opportunities by the utilities. Power needs of rural off-grid communities are relatively modest and therefore compatible with stand-alone PV systems. Estimates indicate that 5 to 10% of the non-electrified domiciles (approximately 250,000) could be supplied with PV systems.

The estimated total installed capacity of PV systems in Brazil is beyond 12 MWp. There is only one local manufacturer of complete PV systems, the company **Heliodinamica**, which has sold an estimated 2 MWp. **Siemens Solar** used to manufacture PV modules in Brazil during 1998 to 2001, importing the solar cells and mounting the modules in Brazil.

Other components of PV systems (batteries, inverters, charge controllers) can also be found from local manufacturers, with some difficulty. In many cases they are adapted from other uses, and not specifically designed for PV application. However, if demand increases in the future, the local manufacturers are expected to diversify their product line.

The main applications for PV systems in Brazil have been off-grid residences, public services (schools, hospitals, etc), water pumping and telecommunications. There are many initiatives underway in Brazil utilizing stand-alone PV systems and more than 30,000 of them were purchased for rural electrification. The **USDOE** has supported some of these initiatives, as well as the German International Cooperation Agency **GTZ**, some Brazilian power utilities and many local NGOs. Most of the systems are operating, but there is a considerable amount of failure, due to operational or financial problems, or abandonment due to the arrival of grid electrification. The main reasons for problems hindering PV dissemination are: very low income of the population in off-grid areas which are PV's main target, poor housing conditions of this population, very dispersed domiciles, low consumption of energy and difficult conditions for maintenance of equipment.

The largest of the PV initiatives in Brazil is the **PRODEEM**, of the Brazilian Ministry of Mines and Energy, created in 1994 to supply electricity to public organizations in remote areas of the country. It has relied mainly on PV systems, for installation in schools, healthcare units, police stations, telephone centers, churches, water pumps, etc. Some 8,000 systems have been installed. PRODEEM has faced several difficulties, especially in regards to long-term operation and maintenance, and there were some failures in the first installed systems.

Within the PRODEEM program, **BP Solar** supplied PV systems in 1852 schools, with 656,000 kWh/year, at a cost of US$10.4 million. **Isofoton** supplied and installed more than 700 similar systems. The **Cemig** power utility has more than 1,000 PV systems installed in residences and schools.

The first and largest Brazilian grid-connected PV system was installed by the electric utility **CHESF**, in the city of Recife in 1995 for 11 kWp, polycrystalline. Three other systems were installed by university research groups: Federal University of Santa Catarina in 1997 for 2kWp, amorphous; University of Sao Paulo in 1998 for 750Wp monocrystalline, and Federal University of Rio de Janeiro in 1999 for 848 Wp monocrystalline. These applications are primarily for demonstration and research purposes, only. Most of the power utilities in Brazil have not worked with solar PV systems, not even for research purposes.

Key Organizations and Resources

CRESESB, as previously mentioned.

GREENSOLAR Reference Center for Solar Thermal Energy (not PV) belongs to the PUC University of Belo Horizonte, www.green.pucminas.br research and promotion of solar thermal energy.

Federal University of Rio de Janeiro, department COPPE, research program for alternative energy, especially solar energy. www.solar.coppe.ufrj.br.

CB-Solar Brazilian Center for the Development of the PV Solar Energy at the PUCRS University in Porto Alegre www.pucrs.br

Labsolar, specialized laboratory of the Federal University of Santa Catarina, www.labsolar.ufsc.br.

ABRAVA Brazilian Association of the Air Conditioning, Ventilation and Heating Industry, www.abrava.com.br has several member companies that are manufacturers of solar water-heating equipment. It has created a special department for solar heating.

The **University of São Paulo** USP, www.usp.br.

Heliodinamica www.heliodinamica.com.br, the only manufacturer of turn-key solar PV systems in South America.

Instituto Eco-Engenho, conceived and implemented a photovoltaic program that installed over 3,000 domestic solar PV systems, successfully delivering clean electricity to power lights and small electro domestic appliances, in addition to PV powered water pumps and electricity for schools, health clinics, community centers, churches, etc. www.ecoengenho.org.br.

IDER, an NGO based in Fortaleza, promotes renewable energy. IDER has implemented numerous wind projects and community-based solar home system initiatives. www.ider.org.br.

Additional Resources

- For more information about export opportunities in this sector contact US Commercial Service Trade Specialist Mauricio Vasconcelos at: mauricio.vasconcelos@mail.doc.gov
- For a good overview of exporting to Brazil, please look at our US Country Commercial Guide to Brazil: www.focusbrazil.org.br/ccg
- US Commercial Service in Brazil: www.buyusa.gov/brazil
- For more reports on this sector in other countries, please visit Export.gov's site for US Commercial Service Market Research Worldwide: http://www.export.gov/marketresearch.html